Mortality

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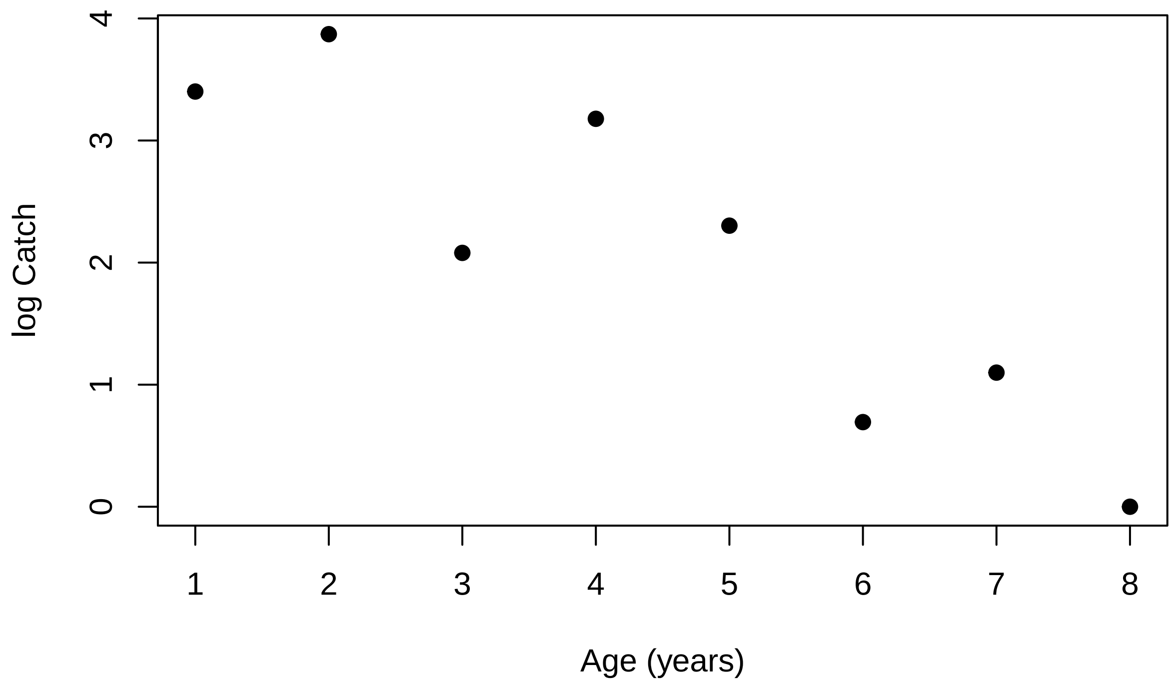
see smith et al. 2012




```
LMB.cr <- chapmanRobson(ct ~ Age, data = catch, ages2use = 2:8)
cbind(summary(LMB.cr), confint(LMB.cr))
```

```
##     Estimate Std. Error    95% LCI    95% UCI
## S 54.7619048  3.4428515 48.0140399 61.5097696
## Z  0.5983568  0.1078207  0.3870321  0.8096815
```

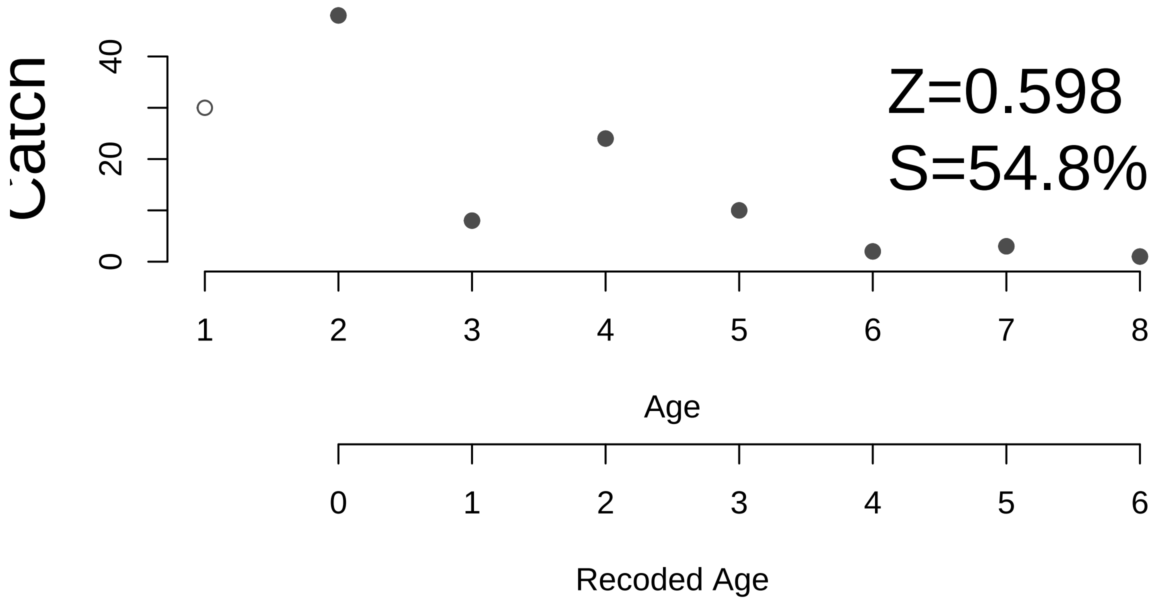
```
A.cr <- 1 - exp(-coef(LMB.cr)[[2]])
A.cr
```

```
## [1] 0.4502858
```

```
Acr.CI <- 1 - exp(-confint(LMB.cr)[2, ])
Acr.CI
```

```
##   95% LCI   95% UCI
## 0.3209307 0.5550002
```

```
plot(LMB.cr, cex.lab = 2, cex.est = 2, bty = "n")
```



Chapman-Robson $A = 0.4502858, 95\% CI 0.3209307 - 0.5550002$.

Chapman-Robson method is prefered (Dunn et al. 2002,Smith et al. 2012 {D.Ogle 2016 Book})

Instantaneous annual mortality (Chapman-Robson Method, $Z = 0.5983568, sde = 0.1078207, LCI = 0.3870321, UCI = 0.8096815$). Annual mortality calculated from instantaneous annual mortality ($A = 0.4502858$).

Instantaneous annual mortality (Z) was found to be 0.5983568 with approximate 95% confidence intervals between 0.3870321 and 0.8096815. The estimated annual mortality rate (A) is 0.4502858 with approximate 95% confidence intervals between 0.3209307 and 0.5550002.

Remove age 3 Yearclass 2013

```
LMB.cr_B <- chapmanRobson(ct ~ Age, data = catch, ages2use = c(2, 4:8))
cbind(summary(LMB.cr_B), confint(LMB.cr_B))
```

```
##     Estimate Std. Error    95% LCI    95% UCI
## S 55.1546392 3.57990194 48.1381603 62.1711180
## Z  0.5909713 0.06865863  0.4564029  0.7255398
```

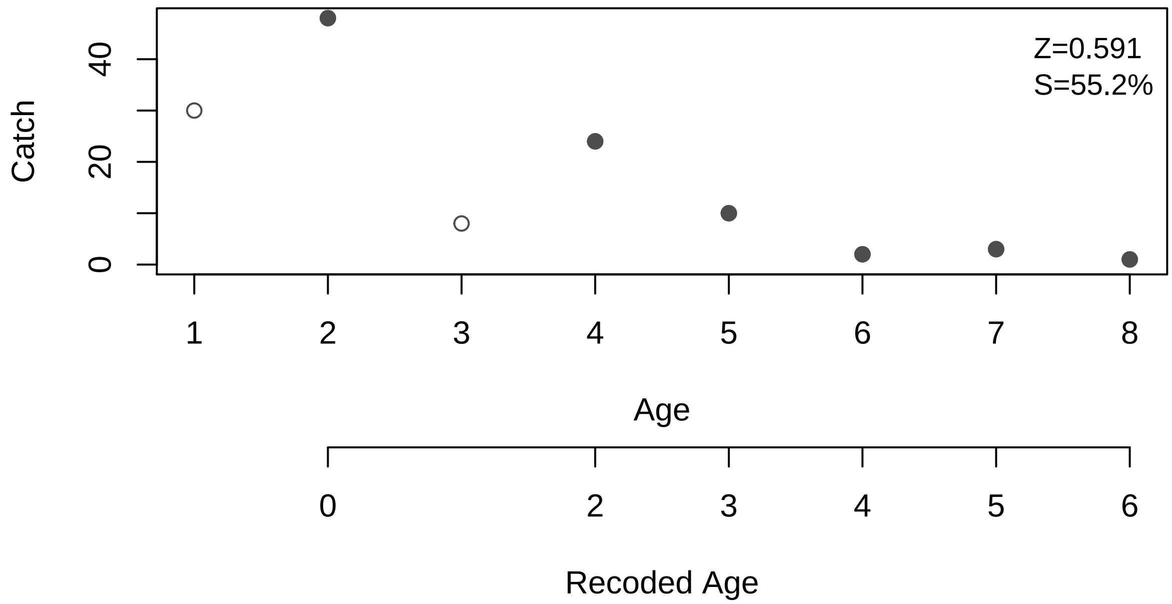
```
A.crB <- 1 - exp(-coef(LMB.cr_B)[[2]])
A.crB
```

```
## [1] 0.4462109
```

```
Acr.CIB <- 1 - exp(-confint(LMB.cr_B)[2, ])
Acr.CIB
```

```
##   95% LCI   95% UCI
## 0.3664415 0.5159368
```

```
plot(LMB.cr_B)
```




```r
tmp <- filter(catch, Age >= 2) %>% mutate(lnct = log(ct))
lm1 <- lm(lnct ~ Age, data = tmp)
coef(lm1)
```

```
## (Intercept)         Age
##   4.7568930  -0.5735774
```

```r
confint(lm1)
```

```
##                  2.5 %     97.5 %
## (Intercept)  3.0178577  6.4959283
## Age         -0.8965082 -0.2506467
```

```r
### weighted regression
tmp %<>% mutate(wts = predict(lm1))
lm2 <- lm(lnct ~ Age, data = tmp, weights = wts)
coef(lm2)
```

```
## (Intercept)         Age
##   4.6614267  -0.5483581
```

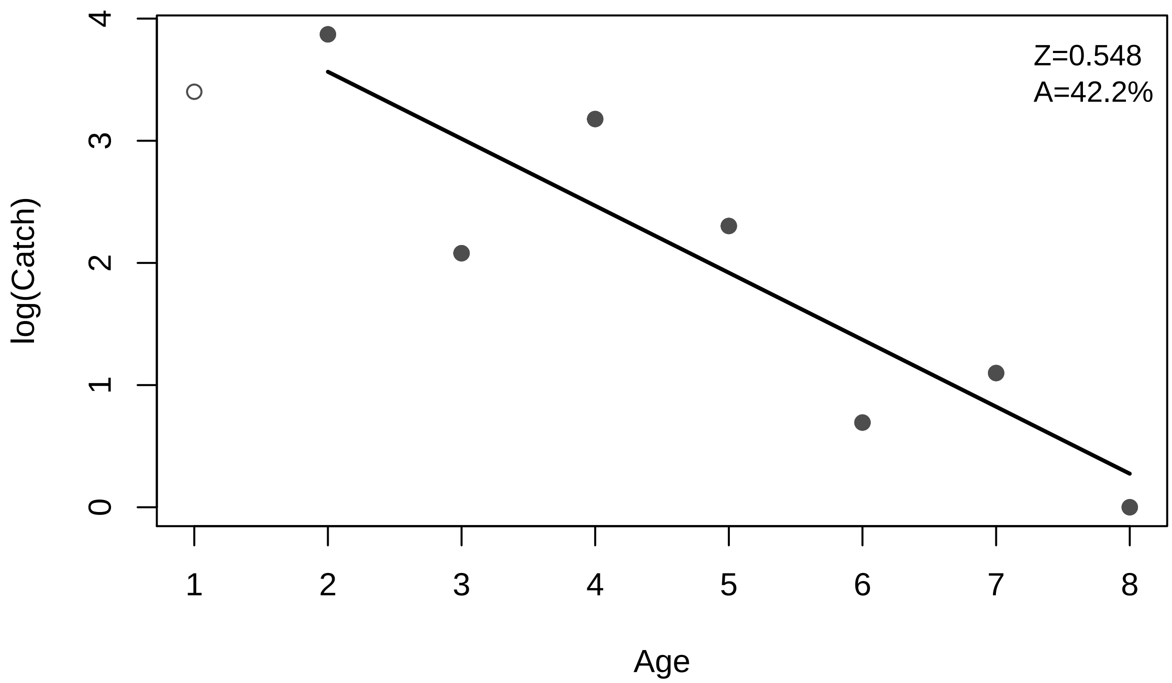
```r
confint(lm2)
```

```
##                 2.5 %      97.5 %
## (Intercept)  2.799384  6.52346957
## Age         -1.001916 -0.09479998
```

```r
### Same thing but with catchCurve() from FSA
LMB.lm <- catchCurve(ct ~ Age, data = catch, ages2use = 2:8, weighted = TRUE)
cbind(summary(LMB.lm), confint(LMB.lm))
```

```
##     Estimate Std. Error  t value  Pr(>|t|)    95% LCI   95% UCI
## Z  0.5483581  0.1764418 3.107869 0.0266149 0.09479998  1.001916
## A 42.2102115         NA       NA        NA 9.04451546 63.282482
```

```r
plot(LMB.lm)
```


Z=0.548
A=42.2%
log(Catch)
0
1
2
3
4
1
2
3
4
5
6
7
8
Age